

*The*  
*Condensed Chemical*  
*Dictionary*

EIGHTH EDITION

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*Exhibit B  
(p 1 f 3)*



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**Derivation:** Reduction of ortho-nitrophenetole with iron filings and hydrochloric acid.

**Hazard:** Highly toxic by ingestion and inhalation. MCA warning label.

**Use:** Manufacture of dyes; laboratory reagent.

**Shipping regulations:** (ICC, CG, IATA) Poison label. para-phenetidine (4-aminophenetole)  $\text{NH}_2\text{C}_6\text{H}_4\text{OC}_6\text{H}_3$ .

**Properties:** Colorless oily liquid; becomes red to brown on exposure to air and light. Sp. gr. 1.0613 (15°C); m.p. 2.4°C; b.p. 253–255°C. Insoluble in water; soluble in alcohol. Combustible.

**Derivation:** Ethylating para-nitrophenol with ethyl sulfate or chloride in presence of sodium hydroxide followed by reduction with iron filings and hydrochloric acid.

**Hazard:** Highly toxic by ingestion and inhalation. MCA warning label.

**Uses:** Dyestuffs intermediate; pharmaceuticals; medicine; laboratory reagent.

**Shipping regulations:** (ICC, CG, IATA) Poison label.

**phenetole** (phenyl ethyl ether)  $\text{C}_6\text{H}_5\text{OC}_2\text{H}_5$ .

**Properties:** Colorless liquid; b.p. 172°C; m.p. –30°C; sp. gr. 0.967 (20/4°C); insoluble in water; soluble in alcohol and ether. Combustible; low toxicity.

**para-phenetolecarbamide.** See dulcin.

**phenetsal.** See para-acetylaminophenyl salicylate.

**"Phenex."** Trademark for alpha-ethyl-beta-propyl-acrylaniline. Used as an accelerator for natural and synthetic rubber and latexes.

**"Phendone."** Trademark for 1-phenyl-3-pyrazolidone (q.v.).

**phenindione** (2-phenyl-1,3-indandione)  $\text{C}_{15}\text{H}_{16}\text{O}_2$ .

**Properties:** Pale yellow crystalline material; practically odorless; insoluble in water; soluble in methanol, alcohol, ether, acetone, benzene. Solutions in alkalies are red; in concentrated sulfuric acid blue.

**Use:** Medicine (blood anticoagulant).

**pheniramine maleate** (prophenylpyridamine maleate)

$\text{C}_{16}\text{H}_{20}\text{N}_2\cdot\text{C}_6\text{H}_4\text{O}_4$ . 1-Phenyl-1-(2-pyridyl)-3-dimethylaminopropane maleate.

**Properties:** White crystalline powder with faint amine-like odor. M.p. 104–108°C. Very soluble in alcohol and water, only slightly soluble in benzene and ether. 1% solution has pH between 4.5–5.5.

**Grade:** N.F.

**Use:** Medicine (antihistamine).

**"Phenmed."** Trademark for a 10% phenylmercuric acetate aqueous solution. Used as a turf fungicide.

**Hazard:** Highly toxic.

**phenobarbital** (phenylbarbital; phenylethylmalonylurea; 5-ethyl-5-phenylbarbituric acid)  $\text{C}_{11}\text{H}_{12}\text{N}_2\text{O}_3$ .

**Properties:** White, shining, crystalline powder odorless, stable. M.p. 174°–178°C. Soluble in alcohol, ether, chloroform, benzene, alkali hydroxides, alkali carbonate solutions; sparingly soluble in water. Said to remove DDT residues from body.

**Derivation:** Condensation of phenylethylmalonic acid derivatives and urea.

**Grade:** U.S.P.

**Containers:** Glass bottles; fiber cans, drums.

**Hazard:** Toxic; may have damaging side effects. See barbiturate.

**Use:** Medicine (sedative); laboratory reagent. Also available as the sodium salt, which has good water-solubility.

**phenocoll hydrochloride** (aminoacetophenetide hydrochloride; glycocoll-para-phenetidine hydrochloride)  $\text{C}_8\text{H}_{11}\text{NO}_2\text{H}_2\text{O}_2\text{Cl}$ .

**Properties:** Fine, white crystalline powder; soluble in water and warm alcohol; slightly soluble in chloroform, ether and benzene. M.p. 95°C.

**Derivation:** By the action of aminoacetic acid upon phenetidine and acidifying.

**Use:** Medicine.

**"Pheno" Dyes."** Trademark for a group of direct dyes used for coloring paper.

**"Phenolform."** Trademark for a series of dyestuffs and pigments used to color phenol-formaldehyde resins.

**phenol.**

(1) A class of aromatic organic compounds in which one or more hydroxy groups are attached directly to the benzene ring. Examples are phenol itself (benzophenol), the cresols, xylenols, resorcinol, naphthols. (2) Phenol (carbolic acid; phenyl acid; benzophenol; hydroxybenzene)  $\text{C}_6\text{H}_5\text{OH}$ .

**Properties:** White, crystalline mass which turns pink or red if not perfectly pure or if under influence of light; absorbs water from the air and liquifies; distinctive odor; sharp burning taste. When in very weak solution it has a sweetish taste; sp. gr. 1.07; m.p. 42.5–43°C; b.p. 182°C; flash point 172.4°F. (C.C.). Soluble in alcohol, water, ether, chloroform, glycerol, carbon disulfide, petrolatum, fixed or volatile oils and alkalies. Combustible. Autoignition temp. 1319°F.

**Derivation:** No less than six different processes have been in commercial use in the last decade. Almost 75% of the phenol in the U.S. is made by the oxidation of cumene, yielding acetone as a by-product. Its economic success depends upon a reliable supply of cumene and an active market for acetone. The first step in the reaction yields cumene hydroperoxide, which decomposes with dilute sulfuric acid to the primary products, plus acetophenone and phenyl dimethyl carbinol. Other processes include sulfonation, chlorination of benzene, Raschig, and oxidation of benzene.

**Method of purification:** Rectification.

**Grades:** Fused, crystals or liquid, all as technical (82%, 90%, 95%, other components mostly cresols); C.P. and U.S.P.

**Containers:** 25- and 55-gal drums; tank cars; tank trucks.

**Hazard:** Highly toxic by ingestion, inhalation; and skin absorption. Strong irritant to tissue. Tolerance, 5 ppm in air. MCA warning label.

**Uses:** Phenolic resins; epoxy resins (bisphenol-A); nylon-6 (caprolactam); 2,4-D; selective solvent for refining lubricating oils; adipic acid; salicylic acid; phenolphthalein; pentachlorophenol; acetophenetidine; picric acid; germicidal paints; pharmaceuticals; laboratory reagent; dyes and indicators; slimicide.

**Shipping regulations:** (ICC, CG, IATA) Solid, or liquid if containing over 50% benzophenol; Poison label. Legal name: carbolic acid.

**phenolate process.** A process for removing hydrogen sulfide from gas by the use of sodium phenolate, which reacts with the hydrogen sulfide to give sodium hydrosulfide and phenol. This can be reversed by steam heat to regenerate the sodium phenolate.

**phenol coefficient.** In determining the effectiveness of a disinfectant using phenol as a standard of comparison, the phenol coefficient is a value obtained by dividing the highest dilution of the test disinfectant by the highest dilution of phenol that sterilizes a given culture of bacteria under standard conditions of time and temperature.

See also disinfectant.

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Exhibit B (P 2 of 3)

## PHENOXYMETHYL PENICILLIN

**phenol-formaldehyde resin.** The first synthetic thermosetting polymer, the reaction product of phenol with aqueous 37-50% formaldehyde at 50-100°C, with basic catalyst; discovered by Baekeland (q.v.) in 1907 and trademarked "Bakelite" in 1911. Polymerization is of the condensation type, proceeding through three stages. With an acid catalyst novolak resins (q.v.) are produced, which are thermoplastic. Properties: Gray to black, hard, infusible solid when cured; resistant to moisture, solvents and heat up to 200°C; dimensionally stable; good electrical resistance; noncombustible; sound- and noise-absorbent; decomposed by oxidizing acids; fair resistance to alkalies. Cannot be successfully colored. Generally nontoxic. Uses: Molded and cast articles; bonding powders; ion exchange; laminating and impregnating; plywood and glass-fiber composites; ablative coatings for aerospace use; binder for oil-well sands; paints and baked enamel coatings; thermal and acoustic insulation, brake linings, clutch facings, shell molds; chemical equipment, machine and instrument housings, machine parts, electrical devices. See also A-, B-, and C-stage resin; novolak; Baekeland; phenolic resin.

**phenol-furfural resin.** A phenolic resin that has a somewhat sharper transition than phenol-formaldehyde from the soft, thermoplastic stage to the cured, infusible state and can be fabricated by injection molding since it has little tendency to harden before curing conditions are reached.

**phenolic resin.** Any of several types of synthetic thermosetting resin obtained by the condensation of phenol or substituted phenols with aldehydes such as formaldehyde, acetaldehyde, and furfural. Phenol-formaldehyde resins (q.v.) are typical and constitute the chief class of phenolics.

**phenolphthalein.** ( $C_6H_5OH)_2C_6O_2C_6H_4$  (an approximation). 3,3-Bis(para-hydroxyphenyl)phthalide. Properties: Pale yellow powder; forms an almost colorless solution in neutral or acid solution in presence of alkali, but colorless in the presence of large amounts of alkali. Soluble in alcohol, ether, and alkalies; insoluble in water. Sp. gr. 1.2765; m.p. 261°C.

Derivation: Interaction of phenol and phthalic anhydride in sulfuric acid.

Grades: Technical; pure reagent; N.F.

Containers: Bottles; cans; drums.

Uses: Dyes; acid-base indicator; laboratory reagent; medicine (laxative).

**phenol red.** See phenolsulfonephthalein.

**phenols, high-boiling.** Mixtures containing predominantly meta-substituted alkyl phenols. Properties: Average molecular weight 150; sp. gr. (20°C) 1.033; b.p. 238-288°C; vapor pressure (20°C) 0.01 mm; sets to glass below -30°C; flash point 250°C; slightly soluble in water. Combustible. Hazard: Highly toxic.

Uses: Phenolic resins; solvents; fuel oil sludge inhibitor; germicides; rubber chemicals.

**phenolsulfonephthalein (phenol red)**  
( $C_6H_5OH)_2COSO_2C_6H_4$  (an approximation). Properties: Bright to dark red crystalline powder. Stable in air. Slightly soluble in water, alcohol, and

acetone; almost insoluble in chloroform and ether; soluble in alkali hydroxides and carbonates.

Derivation: Reaction of phenol with ortho-sulfobenzoic acid anhydride. Differs from phenolphthalein in containing an SO<sub>2</sub> group in place of CO.

Grades: Technical; reagent; U.S.P. The U.S.P. spelling is phenolsulfonephthalein.

Hazard: May be toxic.

Uses: Acid-base indicator; diagnostic reagent in medicine; laboratory reagent.

**phenolsulfonic acid (sulfocarboxylic acid)**  $HOC_6H_4SO_3H$ . Properties: Yellowish liquid, becoming brown on exposure to air. A mixture of ortho- and para-phenolsulfonic acids. Soluble in water and alcohol.

Derivation: Action of sulfuric acid on phenol.

Grades: Technical; reagent.

Hazard: Strong irritant to skin and tissue; moderately toxic.

Uses: Water analysis; laboratory reagent; electroplated tin coating baths; manufacture of intermediates and dyes; pharmaceuticals.

Shipping regulations: (I.C.C., C.G., I.A.T.A.) White label. phenol trinitrate. See picric acid.

"**Phenoplast.**" Trademark for a cold-setting liquid phenolic resin coating.

**phenothiazine (thiodiphenylamine)**  $C_{12}H_9NS$  (tricyclic). Properties: Grayish-green to greenish-yellow powder, granules or flakes. Tasteless; slight odor. Insoluble in ether and water; soluble in acetone. M.p. 175-185°C; b.p. 371°C; sublimes 130°C (1 mm).

Derivation: By reaction of diphenylamine and sulfur in presence of an oxidizing catalyst.

Grades: Technical; N.F.

Hazard: Moderately toxic by ingestion. Skin irritant. MCA warning label. Tolerance, 5 mg. per cubic meter of air.

Uses: Insecticide; anthelmintic in livestock; manufacture of dyes and tranquilizers; ingredient of photo-induced polymerization systems; laboratory reagent.

**phenoxyacetic acid**  $C_6H_5OCH_2COOH$ . Properties: Light tan powder; b.p. 285°C; m.p. 98°C; soluble in ether, water, methanol, carbon disulfide, glacial acetic acid. Combustible.

Hazard: May be toxic.

Uses: Intermediate for dyes, pharmaceuticals, pesticides, other organics; fungicides; flavoring; laboratory reagent.

**phenoxybenzamine hydrochloride**  $C_6H_5OCH_2CH(CH_3)N(CH_2C_6H_5)(CH_3)_2Cl \cdot HCl$ . Properties: Crystals; m.p. 137.5-140°C; soluble in alcohol, propylene glycol; slightly soluble in water.

Use: Medicine.

**phenoxydihydroxypropane.** See phenoxypropanediol.

**2-phenoxyethanol.** See ethylene glycol monophenyl ether.

**alpha-phenoxyethylpenicillin.** See penicillin.

**phenoxy-methylpenicillin (penicillin V)**  $C_{14}H_{11}N_2O_5S$ .

Properties: White, odorless, crystalline powder; very slightly soluble in water; soluble in alcohol and acetone. Insoluble in fixed oils; pH of saturated solution is 2.5-4.0.

Grade: N.F.

Use: Medicine (antibiotic for oral use). Available also as potassium salt.

Superior numbers refer to Manufacturers of Trade Mark Products. For page number see Contents.

F. h. bit B (P 3 of 3)

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